



Remarketable News

CHelsea CENTER
FOR RECYCLING AND ECONOMIC DEVELOPMENT

MANUFACTURER PROFILE:

AMT BIOPRODUCTS CORP. CONVERTS FISH WASTE INTO VALUABLE PRODUCTS



AMT Bioproducts Corp. produces high-value products, such as Organic Gem fertilizer, from New Bedford's fish waste.

Headquartered in South Dartmouth, with operations in New Bedford and Vancouver, British Columbia, AMT Bioproducts Corporation (AMT) is demonstrating that companies that adopt sustainability as a core business value can succeed financially, while producing significant environmental and community benefits.

Using a unique patented process developed by Lewis Spencer, one of the company's three founders, AMT converts waste material from seafood processing plants into useful agricultural, consumer, and industrial materials. Spencer began his research into finding revenues in fish processing waste in the early 1990s. During that time, he developed and perfected a process to extract fish cartilage from seafood processing waste enzymatically.

The process eliminates much of the handwork associated with processing fish cartilage for pharmaceutical and nutraceutical use, while simultaneously improving quality, yield, and cost controls. The process also produces a valuable byproduct: liquid fish fertilizer marketed by AMT as Organic Gem. The fertilizer is a pest-resistant growth enhancer for turf, trees, and plants. It has been used successfully as a biostimulant by large growers of beer hops in Idaho, citrus fruits in Florida, and wineries on the West Coast.

The process works on all varieties of fish scraps traditionally generated by New Bedford's fish processing industry, which produces 80 million pounds of fish processing waste per year. Most of this fish waste ends up in the Fort Rodman and Crapo Hill landfills and the New Bedford Sewage Treatment Plant. Fish processors that work with AMT — and there are 25-30 of these companies in New Bedford — will see their landfill disposal cost of \$105 per ton and/or their sewerage surcharge reduced to zero. By converting fish waste into a new valuable resource, AMT reduces the city's nitrogen loadings to Buzzards Bay, while reducing local fish processors' disposal costs at landfills.

The company is undergoing rapid growth, says Chawner Hurd, vice president for external relations. He expects the company's six employees in New Bedford to expand their processing capacity from 1,600 tons of fish waste this year to over 2,600 tons during the coming year. Hurd attributes this growth to their success in marketing their fertilizer in the turf markets, and to golf courses in particular. "We are successfully demonstrating that our product is the only soil amendment they need," says Hurd.

AMT has taken advantage of Chelsea Center services as the company has grown. Through a Recycling-Based Community Economic Development Grant to the New Bedford Area Chamber of Commerce, the company has worked with a consultant, Marsha Gorden of the Resource Technologies Group, to become a more established business within the city. "Marsha has helped us with marketing, external outreach, and our business plan," says Spencer. This summer, AMT took advantage of the Chelsea Center's ReTERN program to hire Bentley College graduate student Sridhar Ramaswami. "He did an amazing job," says Spencer. "Thanks to the Chelsea Center, we now have one of the most comprehensive libraries on soil amendment research available." Most recently, AMT joined the Re-Made in Massachusetts Alliance, a growing network of more than 20 Massachusetts recycled product manufacturers, which the Chelsea Center coordinates.

In May, AMT was the first recipient of the New Bedford Area Chamber of Commerce's Sustainability Award, in recognition of its sustainable practices and outstanding efforts to collect and process local wastes. And on October 29, AMT received the state's Recycling Manufacturer of the Year Award from MassRecycle. The annual award recognizes a Massachusetts manufacturer that shows innovation through the use of recyclable material in their manufacturing process.

For more information, visit AMT online at www.organicgem.org or call (508) 991-6571.

SERVICE PROVIDER PROFILE:

RECYCLING LOAN FUND OFFERS SPECIAL RATES FOR COMPANIES RECYCLING ORGANIC WASTE AND CONSTRUCTION AND DEMOLITION DEBRIS

MassBusiness of Boston is encouraging recycling companies to take advantage of a recent addition to its state-funded Recycling Loan Fund (RLF) Program. Massachusetts companies that collect and/or process solid recyclable materials or that make and/or sell products created from recycled materials may qualify for low-interest rate loans from \$50,000 to \$500,000.

Under its new Fixed Rate Program, companies that handle organic waste or construction and demolition debris may be eligible for fixed rates as low as 4 percent. The program is designed to provide up to 90 percent financing, in conjunction with a conventional lender, for the purchase of equipment or real estate required for recycling or reuse purposes. Financing is structured so that a conventional lender provides up to 50 percent of the total project cost, the RLF provides up to 40 percent (or \$500,000, whichever is less) at a below-market rate and in a junior secured position, with the recipient contributing at least 10 percent of the project cost as equity.

For qualifying companies, financing through the RLF is easy to obtain and is available to those in many different recycling industries, from scrap metal to used clothing to composting. The money can be used for any reasonable business purpose. Companies interested in obtaining a RLF loan through MassBusiness should contact Karen Michalski at (617) 350-8877 ext. 29 or kmichalski@mass-business.com. Correspondence can be mailed to MassBusiness, 50 Milk Street, Boston, MA 02109.

MASSACHUSETTS COMMUNITIES USE RECYCLING TO STIMULATE ECONOMIC DEVELOPMENT

From New Bedford to North Adams, several Massachusetts communities over the past three years have taken advantage of a Chelsea Center grant program that helps identify opportunities for local economic development based on recovering and reusing what's currently thrown out in commercial and municipal waste streams. The Chelsea Center started awarding Recycling-Based Community Economic Development Grants of up to \$25,000 per project in 2000. The next RFR is to be released January 17, 2003. Below are some of the highlights from projects funded this past year:

THE SUSTAINABLE GREATER NEW BEDFORD PROJECT

Sustainable Greater New Bedford (SGNB) is a committee of the New Bedford Area Chamber of Commerce that aims to create jobs and economic growth through sustainable business practices in New Bedford and Dartmouth. In 2002 SGNB received funding from the Chelsea Center and the Greater New Bedford Regional Refuse Management District to examine three waste streams: organic food wastes from fish/shellfish processing, supermarkets, restaurants, and institutions; rubber wastes from the local processing industry and used tires; and scrap wood wastes from construction and demolition and other sources.

SGNB also researched an eco-industrial approach to New Bedford and Dartmouth's waste streams and worked with a consultant who demonstrated how quantities of food, rubber, and wood wastes could all be collected and treated for their highest quality recycling use, either as material or energy inputs. An eco-industrial design showed that these recycling options could result in a new range of products including electricity; organic produce; vermicompost fertilizer; and glass, steel, and other metals. SGNB is pursuing a vermiculture initiative with UMass Dartmouth (UMD), using the university's food scraps to potentially produce approximately \$250 per cubic yard of worm castings. SGNB is also working with UMD to test the application of chipped scrap rubber in road construction through the repaving of several university parking lots.

For further information, contact James Mathes, President, New Bedford Area Chamber of Commerce, New Bedford, MA, (508) 999-5231, jmathes@newbedfordchamber.com.

E6 RECYCLING ENTERPRISE PROJECT



One of several products, these wood letter openers were manufactured from bulk wood waste during the E6 Recycling Enterprise Project.

The City of Worcester generated more than 25,500 tons of solid waste in 1998, including more than 500 tons of bulky waste gathered through the city's curbside program. The cost in 1999 to incinerate the wood portion of waste products alone was \$40,000. The E6 Project, a public-private collaboration of the Martin Luther King, Jr. Business Empowerment Center, the city's Executive Office of Economic Development and Neighborhood Services, the city's Department of Public Works, the Chelsea Center, and Fine Turnage Productions, established a pilot wood recovery and remanufacturing enterprise to reduce the negative impacts of incineration on the city's budget and air quality, while also creating employment and training opportunities to low- to moderate-income persons.

Through the E6 Project, the city saved 15.2% in its bulk waste pick-up costs, created 2.5 full-time jobs, provided skills and training to employees, secured a remanufacturing and retail site, and sold products to existing retail sites. The city expects to divert close to 200 tons of material from the landfill before the year is over. The Martin Luther King, Jr. Business Empowerment Center is currently seeking additional resources to expand the E6 Project to other areas in the city.

For more information about this enterprise, contact Robert Thomas, Executive Director, The Martin Luther King, Jr. Business Empowerment Center, Worcester, MA, (508) 756-6330 x223, robertthomas@mail.com.

SPRINGFIELD ECO-INDUSTRIAL PARK BASELINE STUDY, PHASE II

In 2001, the Springfield Eco-Industrial Program completed the Springfield Eco-Industrial Baseline Study, which examined the materials flows in the City of Springfield to identify material byproducts produced by local manufacturers that could be used as feedstock by other manufacturers of recycled and remanufactured products. The Springfield Eco-Industrial Advisory Board recommended strengthening material connections among businesses within the city, because while many Springfield businesses have local supply connections, few use local recyclables from the waste stream in their production processes.

During Phase II, the city worked with a local corporate partner, Corex Products, Inc., to demonstrate to the community the benefits of building recycling-based relationships. Corex is a national manufacturer and supplier for producers of school furniture and uses recycled materials in its production. The study found that Corex could save up to \$250,000 per year by purchasing a grinder and utilizing local sources of waste hardwood to grind their wood flour on site. In addition, hardwood waste wood sources were identified and contacted, liability issues were researched, and new customers were identified. The project further demonstrates a unique method for assisting local businesses: the city's Planning Department helped connect a local business to local material suppliers.

For additional information, contact Katie Galluzzo, Senior Planner, City of Springfield, Department of Planning, Springfield, MA, (413) 787-6020, galluzzo@javanet.com.

LOWELL COMMUNITY PARTNERSHIP FOR A FOOD WASTE COMPOSTING ENTERPRISE, PHASE II

Since July of 2000, the UMass Lowell's Center for Family, Work & Community (CFWC), the City of Lowell, and City Soil & Greenhouse Co. have partnered to develop a food waste composting venture. The first phase of this project, funded by the Chelsea Center, involved designing, installing and operating a vermicomposting pilot

site located at UMass Lowell, and assessing composting and vermicomposting business opportunities.

During Phase II, the Lowell Community Partnership for a Food Waste Composting Enterprise developed a business plan for Lowell Loam Ltd., a business designed to be a profitable recycling, manufacturing, and sales company that would supply the goods and services needed to manage organic residuals and landscape materials from the University of Massachusetts, the City of Lowell's Parks Department and Public Works Department, and institutional and commercial sector generators. Demand for quality soil amendments by farmers, landscapers, and homeowners forges a natural link between Lowell Loam Ltd. and the local growers, distributors, and consumers of agricultural products, including the restaurants, institutions, and supermarkets that are significant generators of organic materials. The plan demonstrates how an expanded organics management program would sustain local industries and jobs, and how revenue from selling products and services previously supplied from sources outside of the Lowell area would use local cash to support a locally owned business. Ample markets exist for a variety of composted organic products and soils manufactured from elements of the local waste stream.

For more information about this project, contact David Turcotte, Program Manager, Center for Family, Work & Community/UMass Lowell, Lowell, MA, (978) 934-4677, email: David_Turcotte@uml.edu.

TECHNICAL RESEARCH SYMPOSIUM REVEALS EXCITING PROGRESS ON RECYCLED PRODUCTS

The Chelsea Center held its Third Annual Technical Research Symposium on May 8, 2002 at the Karl Weiss Education and Conference Center in Westborough. About 25 presenters and interested parties from Massachusetts agencies and universities attended the event. The researchers were about half way through their funded research when they gave the following presentations about their findings to date.

UMass Lowell and Tufts University – Full-Scale Production of Lightweight Synthetic Aggregate. Lightweight synthetic aggregate (SLA) is made from fly ash and mixed waste plastics for use as a lightweight aggregate in concrete and other products. During this project, thousands of pounds of SLA were made with industrial, full-scale equipment and subsequently, hundreds of concrete blocks were made at a full-scale plant using the SLA. The researchers have obtained a preliminary patent and are working on a full patent. They have also formed a company to develop and market the SLA to construction companies as a substitute for imported natural lightweight aggregate.

Fred Hooper, Geo-Testing Express' Materials Technology Center – Recycled Base/Sub-base Paving Products Containing Plastics.

This project is incorporating mixed waste plastics into base and sub-base paving products (i.e., the pavement layer below the final driving surface) through a cold mix asphalt emulsion process. Researchers evaluated the types of plastics (e.g., manufacturing scrap, consumer containers, and electronics plastics) that could be ground into a viable aggregate and investigated the amounts and sizes of the resulting ground plastics that could be incorporated into the paving mix. Results to date indicate that with the right mix of plastic types, base and sub-base paving product can be made with up to 8% (by weight) ground plastics with as little as 1% asphalt binder. So far the study has shown 3/4-inch aggregate size to be optimum – a size the plastics recycling industry can produce economically.

Prof. Richard Farris and students in the Polymer Science and Engineering Dept., UMass Amherst – High-Pressure High-Temperature Sintering of Cross-linked Rubbers and Applications to Road Paving and Roofing Materials. Researchers have discovered and developed a new process where scrap rubber that has been ground into crumb rubber can be processed into new rubber products at a rate of 100%: high-temperature, high-pressure sintering. Testing of this 100% recycled rubber material has shown that while some characteristics of the recycled rubber have properties similar to, and sometimes even better than, the original virgin rubber, other properties are lost. This process works with most all types of rubber and, on average, the recycled rubber samples had 50-60% of the mechanical properties of the virgin rubber prior to grinding. This recycled rubber can be used in many applications where all the properties of virgin rubber are not required. With small amounts of chemical additives and careful processing, nearly 100% of the original mechanical properties can be recovered for some rubbers.

The researchers have also shown that by blending asphalt with the crumb prior to sintering, a non-melting asphalt modified rubber results, similar to mineral rubber. One possible application of this asphalt-modified rubber would be pavement that could be rolled out, like Astro-Turf, to form roadway surfaces.

Alton Wilson, Department of Textile Sciences, UMass Dartmouth – Flock Fiber Derived from Textile Yarn/Fabric Waste. The researcher is evaluating whether different textile waste fibers can be collected and chopped into small fibers usable for flocking applications. If successful, the process could replace virgin flock fiber as the starting material in flocked products. Preliminary observation of the ground/milled and opened fiber masses from yarn/fabric waste indicate that the fiber masses are very flockable. All of the yarn/fabric waste has been found to be easily opened by either grinding/milling and by garneting. However, the yarn/fabric waste that has been separated and ground/milled has not exhibited electrostatic flock activity as expected, thus all of the fiber derived from the yarn/salvage waste will have to be treated with the proper finish before being used as flock fiber.

Mohsen Kashi Ph.D., and Prof. Chris Swan, Tufts University – Flowable Fill with Mixed-Color Glass Cullet. Flowable fill, similar to Portland cement concrete, is commonly a blend of cement, sand, and water and is widely used in the construction industry. Researchers are trying to overcome technical barriers to replacing the sand component of flowable fill with crushed, mixed-color waste glass. Several samples of flowable fill were made with ordinary sand and mixed-color glass cullet and tested in the lab. The tests included early age bearing strength, undrained shear strength, unconfined compressive strength at different ages, California bearing ratio, and triaxial compression. Several samples are also being monitored for long-term expansion or cracking potential. The test results indicate that the entire sand volume in flowable fill (about 80% of flowable fill volume) can successfully be substituted with mixed color glass cullet for a marketable flowable fill.

When completed, each project's results will be shared in a technical report published on the Chelsea Center's website.

The Chelsea Center is organizing a roundtable to discuss rubber recycling, focusing on recycling rubber into new recycled rubber products and into rubber asphalt for paving. The advantages, disadvantages and economics of existing recycling processes and recently developed technologies will be discussed. The Roundtable will be held in January 2003. Contact Alan Moore at the Chelsea Center at (617) 884-4324 or alanm@chelseacenter.org.

RE-MADE IN MASSACHUSETTS ALLIANCE UPDATE

The Re-Made in Massachusetts Alliance, a network of recycled products manufacturers coordinated by the Chelsea Center, continues to grow and to explore ways for members to assist each other and to create a greater awareness of recycled products manufactured in Massachusetts.

At a meeting earlier this year, Steve Dubin, president of PR Works (www.prworkzone.com), a full-service public relations firm based in Norwell, presented public relations tips and tactics to members of the Alliance. Dubin explained that the press and general public are drawn to stories about “green” companies and products that are equal to or better than the competition. Therefore, Alliance members have a ready-made opportunity to glean free media coverage, which is considered by many to be worth more than paid advertising.

Dubin outlined the many opportunities to generate positive news coverage, including: new technologies launched; new research and development programs implemented; innovative, new, or never announced products; strategic partnerships; community or charitable involvement; tips on recycling; availability of speakers to advise the public and other businesses about getting “green”; awards and special recognition received; and special days or events (from Earth Day to a company’s own celebration).

Dubin also outlined strategies to manage negative press, the development of case studies to demonstrate the human side of a business, and how to start a public relations program. Following the presentation, members discussed how the concepts could be used to promote the Alliance.



Meetings of the Re-Made in Massachusetts Alliance, which currently take place at the MassMEP Manufacturing Assistance Center in Worcester on the third Tuesday of each month, are open to all Massachusetts recycled product manufacturers. To learn more about an upcoming meeting or to join the Alliance today, please contact Michael Dimino at the Chelsea Center at (617) 887-0410 or michaeld@chelseacenter.org.

Founding Members of the Re-Made in Massachusetts Alliance

Aaron Industries Corp.	Littlebrook Management, Inc.
Bay State Paper Company*	Longleaf Lumber, LLC
Claremont Flock Corp.	Mill-Tex
Conigliaro Industries, Inc.*	Pro Pel Plastech*
Corex Products, Inc.	Recycle Away Group Services (RAGS)*
Creative Packaging & Paper, Inc.	Recycline, Inc.
Datron	Red Sun Press
Innovative Design, Inc.	SelecTech, Inc.*

* Steering Committee Member

OTHER NEWS FROM AROUND THE STATE

STATE SUSTAINABILITY INITIATIVE LAUNCHED

In July, Governor Swift signed an executive order creating a multi-agency council on state sustainability. The initiative is aimed at ensuring that state agencies consider the environmental consequences of their actions and develop sound environmental practices capable of sustaining Massachusetts’ high quality of life. The executive order requires that state agencies do their best to recycle, reduce the use of toxic substances, reduce energy consumption and take all other possible measures to reduce the impact of state government activities on the environment. The executive order also establishes a State Sustainability Council comprised of 16 agencies and offices that will oversee statewide efforts to implement the order. For more information, contact Eric Friedman, Director of State Sustainability in the Executive Office of Environmental Affairs, at (617) 626-1034 or eric.friedman@state.ma.us.

WASTECAP HIRES NEW EXECUTIVE DIRECTOR

WasteCap has hired R. Marc Fournier as its new executive director. WasteCap of Massachusetts is the statewide, non-profit, public/private partnership working with the business community to develop and implement cost-effective recycling, buy recycled, reuse, and waste reduction programs. Fournier brings many years of experience in the recycling and solid waste management field to WasteCap. For more information, please visit www.wastecap.org.

WASTECAP CONSIDERS A RECYCLING CONTEST FOR MANUFACTURERS

The Race-to-Recycle is an annual, statewide recycling competition run by WasteCap of Massachusetts. Traditionally the Race has been a contest among office buildings to determine which building can recycle the greatest percentage of its waste. Winners are recognized at an awards ceremony and are promoted through the media. WasteCap is considering expanding the contest to other sectors including a category for manufacturers. If you have interest in planning or participating in a recycling contest for manufacturers, contact Shemariah Blum-Evitts, Race-to-Recycle Program Manager, at (617) 236-7715 or shemariah@wastecap.org. To learn more about the Race-to-Recycle, visit www.wastecap.org/race.htm.

NEWS FROM THE CHELSEA CENTER

EXECUTIVE DIRECTOR AMY PERLMUTTER LEAVES THE CHELSEA CENTER; MICHAEL DIMINO SERVING AS INTERIM DIRECTOR

Dear Friends and Colleagues:

This is to inform you that, as of the end of August, I have left my job as executive director of the Chelsea Center for Recycling and Economic Development. Until a new director is selected, Michael Dimino, our director of business programs, will serve as interim director of the Chelsea Center. Michael and the rest of the staff are fully committed to advancing the Chelsea Center's work and mission during this transition.

I was hired by UMass Lowell as the first director of the Chelsea Center when it was created by the legislature to increase the use of recovered materials by Massachusetts' manufacturers. In the seven and a half years since that time, the Chelsea Center has had a significant, positive impact on recycling market development in the state.

We have increased awareness of the need to support recycling markets as well as collection; brought new products to market; sponsored applied research to overcome various barriers to recycling plastics, rubber, paper, textiles, glass, and other materials; and helped companies market their products through product testing grants, trade show grants, and demonstration projects. We have helped businesses, while introducing students to the field of recycling-based manufacturing, through our ReTERN program; created new business opportunities through our community development through recycling grants (which are leading to businesses that recycle wood waste in Springfield and Worcester and food waste in New Bedford and Lowell); educated business assistance agencies about the need to work with recycling businesses; and more.

The Chelsea Center has grown into a national and international model for recycling market development and has brought recognition to the state for those efforts, including receiving the National Recycling Coalition's 2001 Award for Outstanding Market Development Program. It has been an enjoyable and successful seven and a half years. We could not have been so successful without all the hard work and support of the staff who have worked at the Chelsea Center over the years — Ilya Michaelson, Gail Harris, Jodie Siegel, Kirsten Hickey, Jennifer Capuano, Michael Dimino, and Alan Moore — as well as Ken Geiser and Charley Pace at UMass Lowell; our supporters at the Department of Environmental Protection, the Executive Office of Environmental Affairs, and the Strategic Envirotechnology Partnership; and the numerous manufacturers who have trusted us to work with them.

This is a difficult time with the budget cuts experienced by the state. However, the excellent staff here will continue their work to support communities and businesses in their use of recyclable materials, as resources will allow. Please contact them if you have any needs, and check our website at www.chelseacenter.org often for information on the Chelsea Center and its activities.

If you would like to reach me personally, please feel free to do so at amyperl@post.harvard.edu.

Sincerely,

Amy Perlmutter

CHELSEA CENTER SEES BUDGET CUTS; WILL REDUCE SOME SERVICES

As a result of budget cuts to the state's recycling program and the Strategic Envirotechnology Partnership, the sources of Chelsea Center funding, we are looking at a reduction in services this year. We will still be soliciting applications for interns and product testing and development grants, but these will be more competitive, so please get any requests for these in as soon as possible, as they are typically filled on a first come, first served basis. We unfortunately have had to cut the trade show grant program this year, which has helped many manufacturers market their products over the years.

If you are considering applying for a Recycling-Based Community Economic Development Grant or a Research and Development Grant in the future, we strongly encourage you to continue the process of developing your proposal. We hope that the Department of Environmental Protection and the Executive Office of Environmental Affairs will receive a supplemental budget to help fund their many recycling efforts, including the Chelsea Center, and we will be looking for additional sources of funding. We urge you to keep applying for our grants and services so that we can demonstrate the need for what we do and for more money to do it.

RESEARCH SUPPORTED BY CHELSEA CENTER RESULTS IN NEW PRODUCT LICENSE

UMass Lowell has entered into a licensing agreement with Re-Engineered Composite Systems (RECS) of Odessa, Texas, to market revolutionary new materials made from recycled rubbers and plastics. The re-engineered materials use a rubber/plastic reactive blending technology invented by Dr. Joey Mead and colleagues in the UMass Lowell Plastics Engineering Department to graft plastics onto the surfaces of rubber particles. The Chelsea Center, with Clean Environment Fund (CEF) funds, provided early stage funding for the research.

The worldwide license agreement gives the company the exclusive rights to develop, manufacture, and market materials made using this technology, as well as to sublicense the technology itself. UMass Lowell will receive royalties on every product sold that incorporates the new technology.

"Until now, attempts to blend recycled cured rubber with plastics have been largely unsuccessful. But, now we're able to blend high levels of elastomer, up to 60 to 75 percent by weight, without degrading strength and other properties," said RECS President J. Wayne Rodrigue.

This family of new materials, called RePoly™, is expected to be of great interest to manufacturers of household appliances, automotive parts, construction materials, pet products, electrical and electronics articles, hand and power tools, lawn and garden tools, sporting goods components, fluid delivery products, and more. "There are incredible opportunities in product development and tremendous cost savings from the use of recycled materials," said Rodrigue.

Supporting university research on methods to increase the amount of materials that can be recycled is an important part of the Chelsea Center's efforts. "We see funding university research as a key component in the overall effort to expand our ability to increase the recycling rate in the state," said Alan Moore, director of technical programs for the Chelsea Center. "This project is a perfect example of how the results of technical research can lead to a new process

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and new products. That helps the economy not only by creating new businesses and new products, but also by expanding the demand for the waste materials used as feedstock,” said Moore.

NEW TECHNICAL REPORTS AVAILABLE

Six new technical reports on research sponsored by the Chelsea Center have been released since our last newsletter:

Technical Report #40: Powder Processing Techniques to Recycle Rubber Tires into New Parts from 100% Reclaimed Rubber Powder/Crumb

Technical Report #41: Asbestos Analysis of Post-Consumer Asphalt Shingles

Technical Report #42: Plas-Crete: A Lightweight, Portland Cement Concrete Product Manufactured from Discarded Mixed No. 3-7 Plastics

Technical Report #43: Feasibility of Lead-Free Plastic Fishing Terminal Tackle

Technical Report #44: Opportunities for Scrap Textile Feedstock Conversion in New England

Technical Report #45: Fly Ash/Plastic Synthetic Aggregate for Construction Material

All reports are available free of charge to businesses, individuals, and governments in Massachusetts, and are \$10 each for out-of-state requests. The reports are also available free of charge in PDF format on our website at www.chelseacenter.org, under “Publications.”

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The Chelsea Center is part of the Lowell Center for Sustainable Production at the University of Massachusetts, Lowell and was formed under the state's Strategic Envirotechnology Partnership (STEP). Grant funding comes from the Executive Office of Environmental Affairs, through the Clean Environment Fund, which is comprised of unredeemed bottle deposits.

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